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CURRENT USAGE AND POTENTIAL OF COMPUTER SUPPORTED COOPERATIVE WORK IN SWISS BANKS: AN EMPIRICAL STUDY

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Abstract

The results presented in this paper are part of an empirical study into the current usage of groupware and the potential of Computer Supported Cooperative Work (CSCW) for strategic management in large-scale Swiss business enterprises. The results were obtained from a survey conducted among 168 organizations. The study is part of the STRATUM research project, the overall goal of which is to investigate and evaluate methods, techniques and tools to support cooperative activities in strategic management groups. Due to the importance of the banking sector in Switzerland and the high response rate from the bank sample, we present here results related to this sector of industry.

1. INTRODUCTION

The results presented in this paper are part of a study into the current usage of groupware and the potential of Computer Supported Cooperative Work (CSCW) for strategic management in large-scale Swiss business enterprises. The sample of the study includes all branches of industry. In the following sections we will present results related to the banking sector. We have chosen this branch of industry because of its great importance in Switzerland and the high response rate of the bank sample.

The study falls within the STRATUM research project (Teufel 1993). The overall goal of STRATUM is to investigate and evaluate methods, techniques and tools to support cooperative activities in strategic management groups. The management and coordination of the long-term evolution of a business enterprise is, particularly in large-scale business enterprises, characterized by complex facts, and therefore cannot be carried out by one person individually. Wide cooperative activities are necessary to ensure high-quality strategic decisions which are needed to ensure long-time successful survival of the business enterprise. Such group oriented activities can be supported by new technology, so-called groupware for example (Tyran et al. 1992).

As new technology is developed to support cooperative work, it is important to understand how that technology can best be applied to help users accomplish their work. For that reason a clear understanding of group work, as prerequisite for design or redesign of adequate groupware, is included in research frameworks that many research groups have developed (Krcmar 1991; Teufel et al. 1995).

Following the concept of such a research framework, we first have to determine the current usage of groupware and the nature of group work in strategic management. We therefore formulated the following research question: *What is the current usage of groupware and the potential of CSCW for strategic management in the largest business enterprises in Switzerland?*

2. BACKGROUND TO THE STUDY

In order to obtain answers to our research question, we conducted an empirical study (Morger et al. 1995). To explore the domain in a broad manner, we applied a *descriptive* method. Questionnaires were mailed to participants in September 1994, with the reply deadline set as the middle of November 1994. Processing and analysis have been in progress since November 1994.

The subject of the study is strategic management in large-scale Swiss business enterprises. As we suggest in section 3.1, one can assume that strategic management is performed by top management. For this reason, we decided to target this group, addressing our questionnaire to the CEO or a member of the Senior Management Group (and where possible, in this case, to the person responsible for the IS department or IS function).

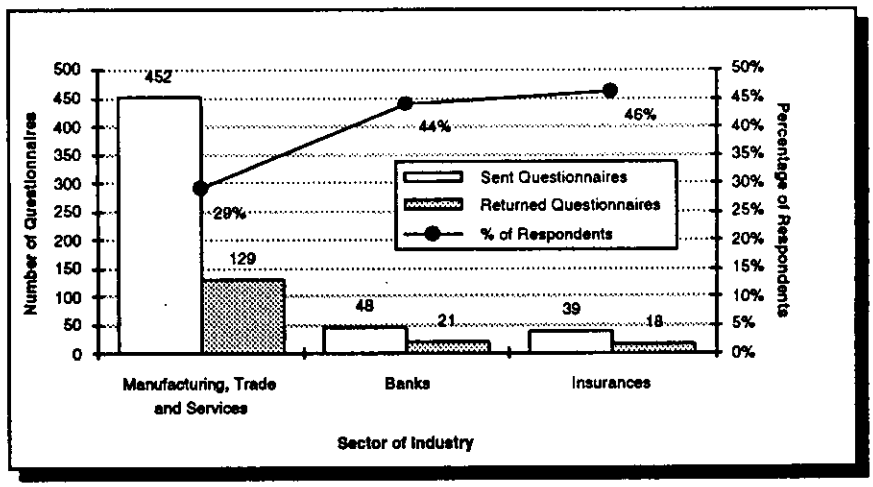

Figure 1. Distribution of the Sample and Percentage of Respondents for Each Sector

As the method for data collection, we decided to use a standardized questionnaire. The questionnaire consisted of four parts — general information about the enterprise, communication within the enterprise, meetings and strategic management — with seventeen questions and several sub-questions, so that the evaluation of about 300 answers was possible. Most questions were qualitative questions. We utilized the resulting data through frequency counts. In some cases we extended those results with mean values (mode and median). In cases of quantitative questions we obtained interval scaled data (e.g., percentage distribution). We utilized this data through calculating arithmetic means and standard deviations.

The domain of the survey was business enterprises in Switzerland. For the selection of business enterprises, we considered two criteria: *sector of industry* and *scale of the enterprise*. We assumed that the topic of CSCW in strategic management was not limited to specific sectors of industry and thus included all sectors (manufacturing, trading, services, banking and insurance).

Typical problems of strategic management are characterized by high complexity and low frequency of repetition (Schoemaker 1993). For such problems in particular, group work is appropriate. We assumed the following: the bigger the enterprise, the more complex the problems of strategic management; the more the need for group work; and thus the more the need for groupware. We therefore decided to restrict our survey to large-scale enterprises.

For the selection of enterprises, we took the following criteria:

- *turnover* for manufacturing, trade and services: ≥ US $ 125 million
- *total assets* for banks: ≥ US $ 1.5 billion
- *gross premium income* for insurances: ≥ US $ 75 million

As a result of the selection process, we arrived at 539 business enterprises. In order to achieve representative statements about the domain of the survey, we decided to include all 539 enterprises in our inquiry.

The response rate to our survey was 31% (168 returned questionnaires) while the response rate of the sample considered in this paper (banks) was 44%. Figure 1 shows the distribution of the sample, with percentage of respondents for each sector of industry. From our viewpoint, the high response rate of the banking and insurance sectors can be interpreted as confirming that the usage of information technology is well developed in these sectors of industry or that there is at least a firm interest in IT and in assisting in the collection of empirical data. The discussion and assessment of the topic computer supported cooperative work is therefore more representative for the persons questioned in the banking environment than for those of the manufacturing, trading and service sectors where responses were more sparse.

In the next section, we will present the fields of our investigation. First we introduce strategic management as we see it from the viewpoint of our work. Next we give a short overview of CSCW, or groupware respectively, in order to convey a clear understanding of the terms we use for different types of groupware. In section 4, we report the results of the survey. We first present the current usage of groupware in the strategic management of large-scale Swiss banks and then show results which give us information about the potential of CSCW for strategic management. In section 5, we present some conclusions and remarks regarding further work.

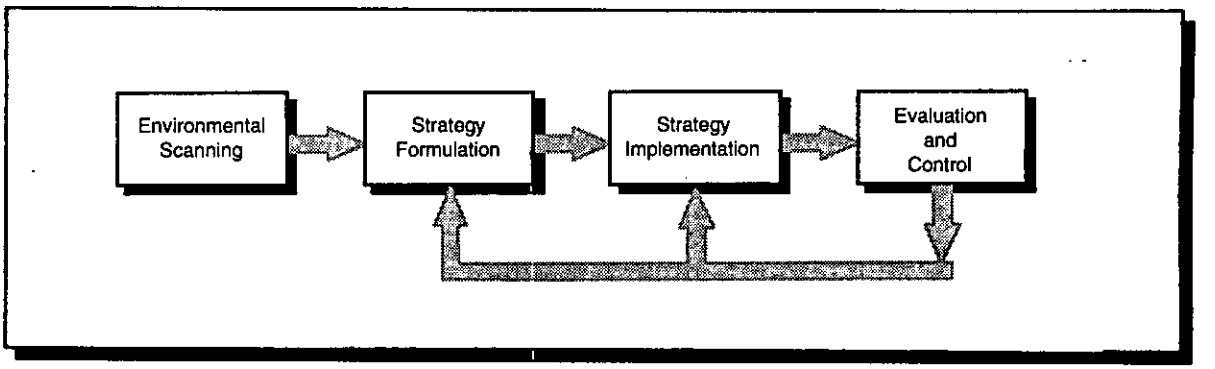

Figure 2. Strategic Management Process (Source: Wheelen and Hunger 1992)

3. FIELDS OF INVESTIGATION

In this section, we elaborate on the theoretical framework on which we based the survey. Strategic Management is first considered and then CSCW is introduced.

3.1 Strategic Management

Strategic management in general is defined as the development and control of the long-term evolution of an enterprise. Strategic management can be viewed from three perspectives (Rühli 1991):

(1) The manner in which strategic management is *instituted*.
(2) Strategic management as a *process*.
(3) Strategic management as an *instrument*.

If we interpret strategic management as *instituted* in an organization, we have to describe the group of persons performing strategic management: in other words, the strategic actors (Wilson 1994). Strategic actors are the people in a business enterprise who are directly involved in the strategic management process. The people with direct responsibility for this process are the board of directors and upper management. We will use the term *top management* as a synonym for strategic actors. Note that top management needs assistance from staff.

Strategic management as a *process* involves four basic elements (Wheelen and Hunger 1992): (1) environmental scanning, (2) strategy formulation, (3) strategy implementation, and (4) evaluation and control (see Figure 2).

Such simple descriptive models are developed in order to illustrate a phenomenon that is very complex in reality. We can assume that many business processes exist in reality, primarily for operational and tactical purposes. At the same time, these processes are the necessary basis of specific phases of the strategic management process. For this reason we cannot clearly demarcate strategic processes from operational processes, e.g., balance sheet policies cannot be performed without having access to relevant accounting data which generally is produced at operational levels.

To perform tasks related to the basic elements of the strategic management process, one can use a large variety of *instruments*. We distinguish instruments that support *generic tasks* of top management from instruments used for *specialized tasks* related to the basic elements of the strategic management process. Instruments used for generic tasks are those which support different processes of interaction between people (typical tools are e-mail or electronic meeting systems); instruments used for specific tasks might be, for example, tools for financial budgeting or strategic information system planning.

3.2 Computer Supported Cooperative Work (CSCW)

The research field CSCW has the overall goal of improving the efficiency and effectiveness of group work through the usage of groupware. Groupware applications are based on different technologies (e.g., video, telecommunication, database management systems). Such applications support a set of functions (e.g., mailing, shared writing) using textual, visual and audio media types. For classifying applications, one can take a schema like the time-space-matrix (Grudin 1994). For *our purposes*, the *functions* of groupware are the most important characteristics. A classification schema which was derived in Sauter, Mühlherr and Teufel (1994) represents this.

Groupware tries to support groups by providing functions for communication, coordination and cooperation. Within this triangular framework we have placed typical group applications, corresponding to their functions. In addition to this, we have classified each application type into a *system class* corresponding to its application concept (see Figure 3). This classification schema allows groupware to be placed, corresponding to its focus of supported functions.

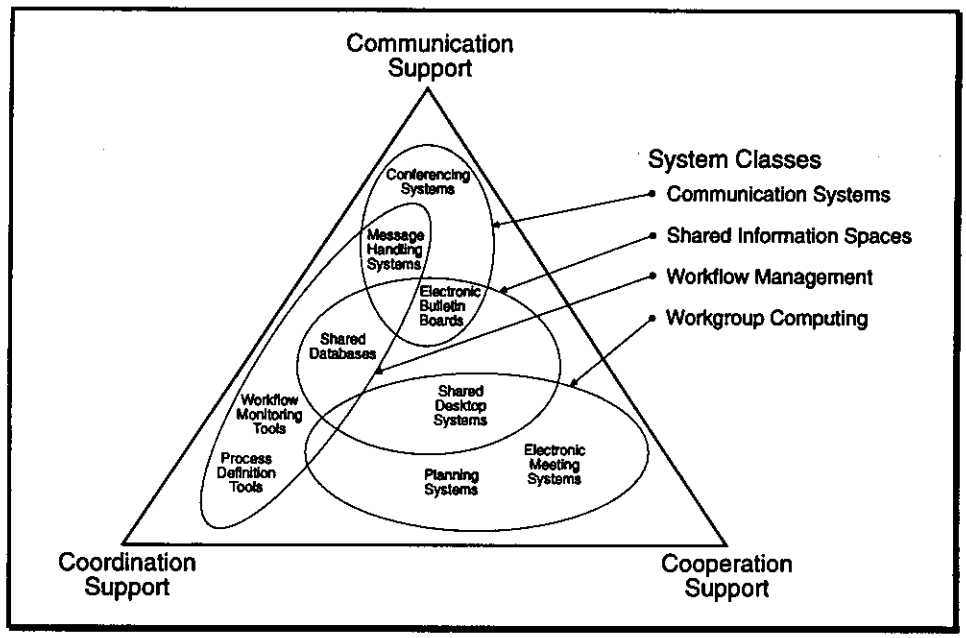

Figure 3. Functional Classification Schema for Groupware (Adapted from Sauter, Mühlherr and Teufel 1994)

We used this schema as the basis for designing our empirical study. For clarification we provide a short description of each system class and a few examples (Teufel et al. 1995).

Communication Systems. Typical groupware applications that focus on supporting communication are message handling systems (e-mail, voice mail, video mail) and conferencing systems (computer conferences, audio conferences, video conferences). We assign such systems to the class of communication systems. The application concept for communication systems is the separation of communication partners according to time or place.

Shared Information Spaces. Groupware such as an electronic bulletin board allows implicit communication between several persons. Such forms of communication can be realized through any form of shared information spaces. Systems of this kind can take on both functions for communication (e.g., electronic bulletin boards) and functions for coordination and cooperation (e.g., in the case of a shared project data management system or a group calendar application).

Workflow Management. Groupware that we place in the system class workflow management has as its priority the support of coordination functions. Coordination functions are specified on the basis of permanent organizational rules with the help of process definition tools. Monitoring tools should enable workflow participants to obtain information concerning different aspects of the business process. Application concepts for this systems class are group tasks that are well structured and have a high frequency of repetition (e.g., customer order processing).

Workgroup Computing. Into the field of workgroup computing fall complex tasks with middle to low frequency of repetition that have to be fulfilled in cooperative groups. With respect to the supported functions, the focus of workgroup computing systems lies in the field of cooperative processes, which means goal-oriented working together. Important representatives of this system class are electronic meeting systems (or group decision support systems), planning systems and shared desktop systems (e.g., shared drawing).

Since CSCW as an identifiable field emerged in the middle of the 1980s, most work has been done in the development of groupware prototypes. A wide spectrum of systems has been developed, e.g., group decision support systems, electronic meeting systems or electronic bulletin boards (Krcmar 1994; Reinhard et al. 1994). Only a few systems are directly related to the field of strategic management or top management, although some of the tasks supported are encompassed in strategic management. Some prototypes or commercial products have been evaluated in case studies with top management groups (Tyran et al. 1992). Some empirical studies have investigated the

application of specific tools (Seward, Diaper and Sanger 1993; Sheffield and Gallupe 1993). Further research has been done in developing theoretical groupware methods and concepts more or less related to the field of strategic management. Only a few studies, however, have explored strategic management from the viewpoint of group work (Reder and Schwab 1990) and none of them has looked at the application of groupware for strategic management in the sense of our perspective.

3.3. Groupware for Strategic Management

As we mentioned in sections 1 and 3.1, the process of strategic management is very complex in reality and a large number of persons are involved in the various processes. These persons can be distributed spatially (possibly in different organizations and locations) and may interact synchronously or asynchronously. The communication, coordination and cooperation that occurs between people can be supported with groupware.

Groupware, which can be used by the strategic actors to support group work activities, can be differentiated into systems that can be used for general communication and systems that are developed for specific problems. General communication systems (which can be used to support *generic tasks*) offer functions to support interactions between people independent of a specific problem (e.g., e-mail, meeting support systems). Systems for specific problems (which can be used to support *specialized tasks*) can be applied for tasks such as financial planning or project planning where they are used exclusively for a particular task.

4. RESULTS OF THE SURVEY

In the following, we present some of the results of the empirical study related to banks as an important sector of industry in Switzerland. First, we provide data about the usage of groupware in strategic management according to our classification schema (see Figure 3). Second, the potential of CSCW for top management is explored.

4.1 Current Usage of Groupware in Strategic Management

Our first objective was to establish whether computer support for top management is provided. The results were that 57% of the respondents said that they use computers supporting strategic tasks personally, 38% said they use no computer and 5% gave no statement.

As pointed out in sections 3.1 and 3.3, one can distinguish instruments supporting *generic tasks* from instruments supporting *specialized tasks*. Generic tasks are communication, coordination and cooperation. Specialized tasks are all tasks that have to be fulfilled within the basic elements of the strategic management process (e.g., market analysis in the process element of environmental scanning). In the following sections, we will first present the survey results related to generic support, then those pertaining to specialized support.

4.1.1 Usage of Systems Providing Support for Generic Tasks. As a basis for exploring the usage of systems providing support for generic tasks we took our classification schema for groupware as shown in Section 3.2. First we asked about each application type: its availability or whether or not it is planned. Second we asked those top managers, for whom the systems were available, how they estimate the importance of each type of system.

Figures 4 and 5 show the results for system classes *communication systems* and *shared information spaces*. The most commonly available communication systems can be seen to be electronic mail and audio conferencing. More than 40% of the respondents indicated that electronic bulletin boards are currently available. It is interesting to note that, while 71% of the respondents have access to audio conferencing, nearly three-quarters of this group consider it to be an unimportant communication medium. Otherwise, nearly 60% considered e-mail as an important or very important communication medium. It seems that asynchronous systems are more useful than synchronous systems currently and the high importance and availability that has been attributed to e-mail shows an impending shift in guiding employees more and more by e-mail than then by oral directives. Furthermore, it is interesting to see that voice mail systems have a high rating of importance in respect to the other systems while electronic bulletin boards seem to have no importance at all.

Figures 6 and 7 show the availability and importance of workflow management and workgroup computing systems. Project management systems are the most commonly available type of system. This was followed by the availability of group calendars. The absence of meeting support systems clearly demonstrates that this type of system has not yet penetrated the business sector of banking. It is evident, from the ratings of importance of these systems, that project management systems are considered more important then group calendars. It is also noteworthy that the bank that has a meeting support system sees it to be unimportant. Furthermore it is significant that 38% of the respondents plan to apply workflow management systems in top management, although workflow systems best support group tasks of high frequency of repetition which would not seem to be characteristic of the intended deployment. From this we can consider that top managers strive for better structuring of their work.

4.1.2 Usage of Systems Providing Support for Specialized Tasks. For exploring the availability and usage of systems providing support for specialized tasks, we presented some typical tasks in the questionnaire according to basic elements of the strategic

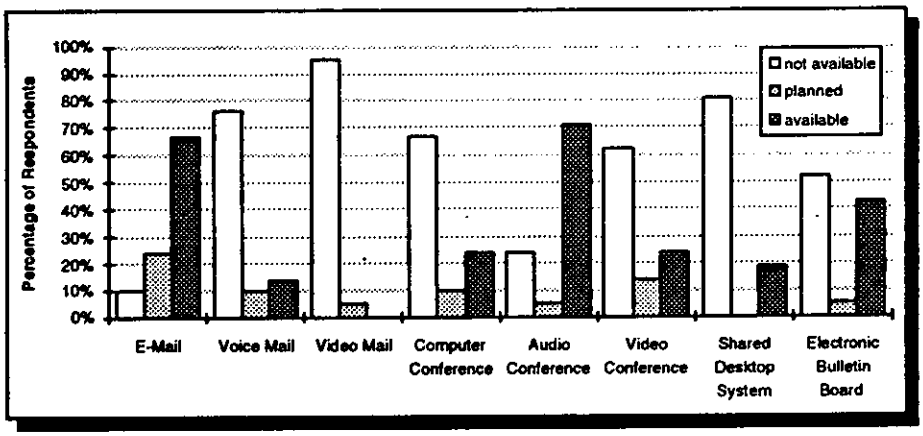

Figure 4. Availability of Communication Systems and Shared Information Spaces

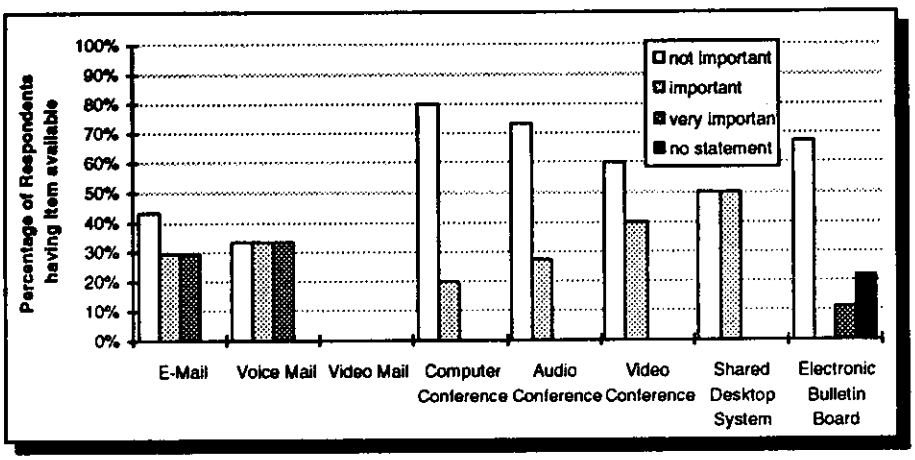

Figure 5. Importance Of Communication Systems And Shared Information Spaces (Where Available)

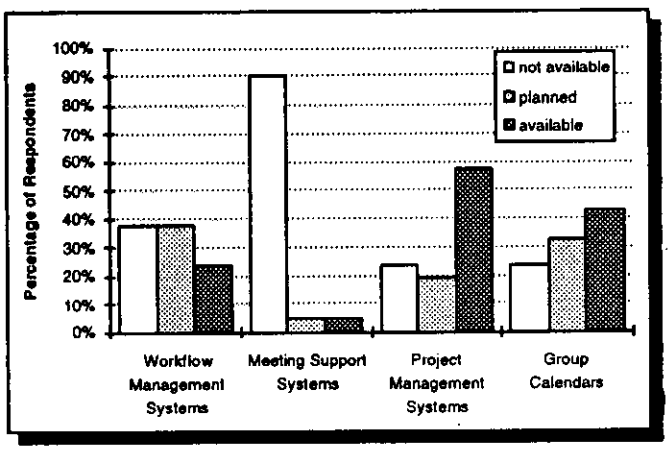

Figure 6. Availability of Workflow Management and Workgroup Computing

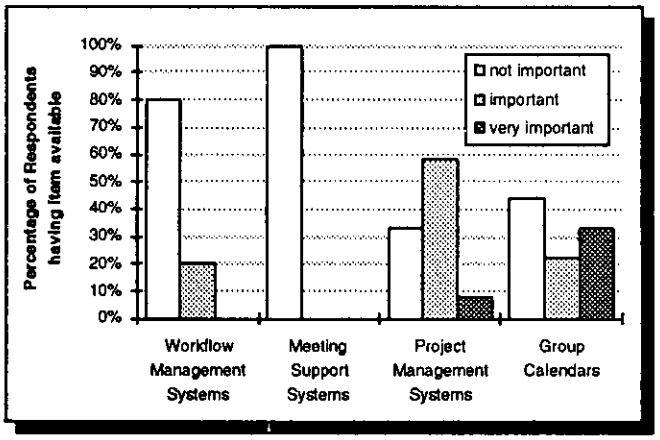

Figure 7. Importance of Workflow Management and Workgroup Computing (Where Available)

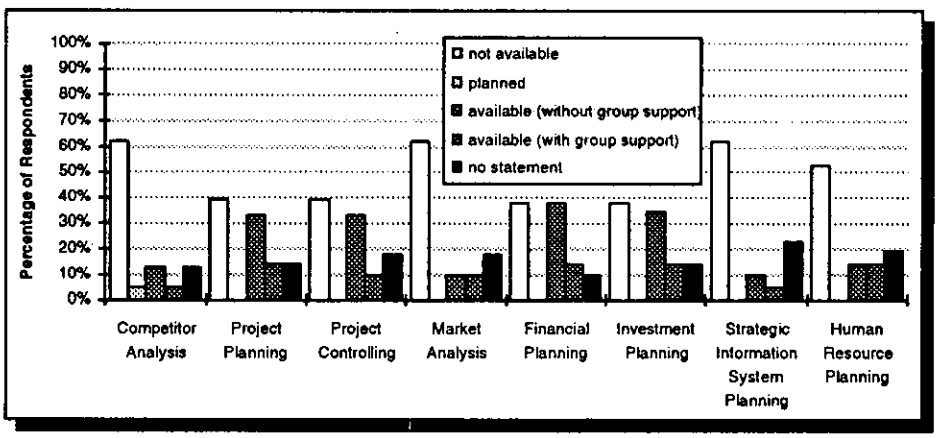

Figure 8. Availability of Systems Providing Support for Specialized Tasks

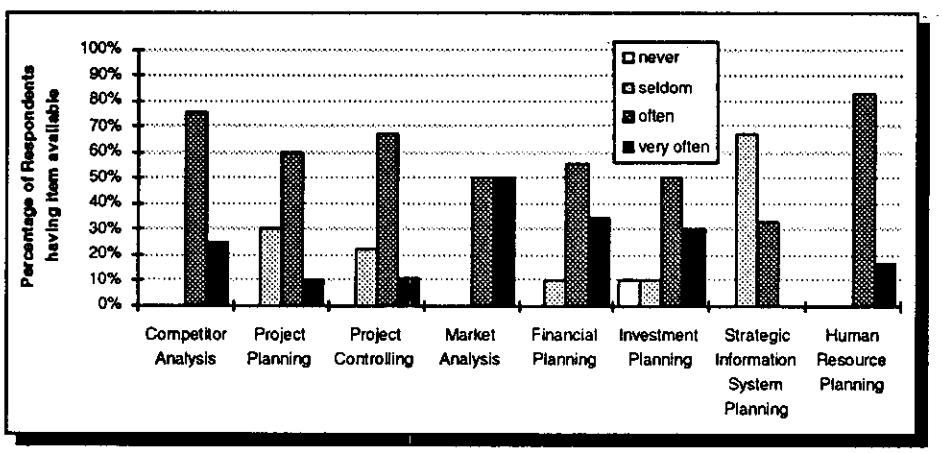

Figure 9. Usage of Systems Providing Support for Specialized Tasks (Where Available)

management process (see Figure 1). Respondents had the opportunity to add tasks or systems respectively. We assumed that most available applications would not support groups. We therefore asked explicitly whether group support is given or not. Figures 8 and 9 show the availability and usage of systems providing support for specialized tasks. The most commonly available systems for specialized tasks are those for financial, investment and project planning which in most cases were used often or very often. Unsurprisingly, most of these (and the other specialized systems reported) are available without group support.

4.2 Potential of CSCW for Top Management

As our second research question, we explored the potential of CSCW for top management. We therefore asked top managers, according to the three perspectives of strategic management (section 3.1), about the general organizational, procedural and instrumental aspects of their environment. Empirical studies show that top managers spend most of their time in meetings (Carroll and Gillen 1987; Kurke and Aldrich 1983) and we attempted to verify this by collecting detailed data about the meetings of top management. In the following sections we will present related results.

4.2.1 Organizational Aspects. One of the questions asked of survey respondents concerned the number of managers who are involved in the strategic management *process* on a regular basis. Clearly the level of involvement can vary, but on average these were the number of participants collaborating in the performance of strategic management. The results of this question are very valuable when considering computer support for the cooperative process of strategic management, since they give an indication of the average number of participants for which such a system should provide. Such information is helpful to developers of groupware in considering how many users may be typical. It can be seen that involvement of one to ten people was true for the majority of responses (see Figure 10). But we also have to take into account that up to thirty-five people were reported by some banks as being generally involved in strategic management processes.

Figure 11 shows that, although participation in the strategic management process is in the range described above, *strategic decision making* is most often by a maximum of ten people while more than ten people are the exception. Considering these results, we assume that provision of functions for voting (often integrated in electronic meeting systems), which directly support the decision process of a group, are not appropriate for strategic decision makers such as those surveyed.

4.2.2 Communication of Top Managers. As we pointed out in section 3.2, support of communication is an important domain of groupware. With this in mind, we collected detailed data about the communication patterns of top management.

Figure 12 shows the arithmetic mean and the median of time spent on communication with different partners of top management. The results show that the arithmetic mean of communication time spent with top managers is 21% while 28% of communication time is utilized with external people. In most cases, top management communicates not mainly within top management but with representatives from all management levels in nearly the same frequency.

Figure 13 shows the arithmetic means of usage of different communication mediums according to the different communication partners of top management. Unsurprisingly, face-to-face communication dominates as the medium of communication between top management and the other groups *within* the enterprise. Nearly 10% of top management's communication is done via electronic mediums both within top management, with lower management and with staff. Only about 2% of top management's communication is conducted electronically with external people. Notable is the dominance of textual communication with external people.

Analyzing the results shown in Figures 12 and 13, we discover that communication of top management is synchronous in most cases. We assume that there is a high potential for substituting or supporting traditional synchronous mediums for communication by groupware (e.g. computer conferencing or meeting systems). We also assume that groupware which is appropriate for the support of textual communication of top management with external persons has great potential.

4.2.3 Meetings in Top Management. Results of empirical studies (Carroll and Gillen 1987; Kurke and Aldrich 1983) looking at the activities of top or middle management show that managers spend most of their time in meetings. Our survey confirmed these results. The average amount of working time in meetings was 43% (median 40%). The average breakdown between time spent in planned and unplanned meetings was 77% planned (median 80%) and 23% unplanned (median 20%).

In order to assess the potential of electronic meeting systems in strategic management, we were also interested in the number of participants in meetings and the duration of meetings. Figure 14 shows the results for planned meetings. We found that in most cases a maximum number of ten people took part in meetings. In addition, we discovered that the duration of meetings ranged mostly between one and four hours.

To find out if top management is satisfied with the current situation (as it has been reported above), we asked the following question: "Are you satisfied with meetings as they are now?" From our point of view, it was interesting to see that about 70% of top managers are satisfied or very satisfied with meetings. We were therefore not surprised about the answers to the following question: "Would you appreciate the application of an Electronic Meeting System?" (Results: 24% *yes*, 24% *no*, 42% *don't know*, 10% *no answer*.)

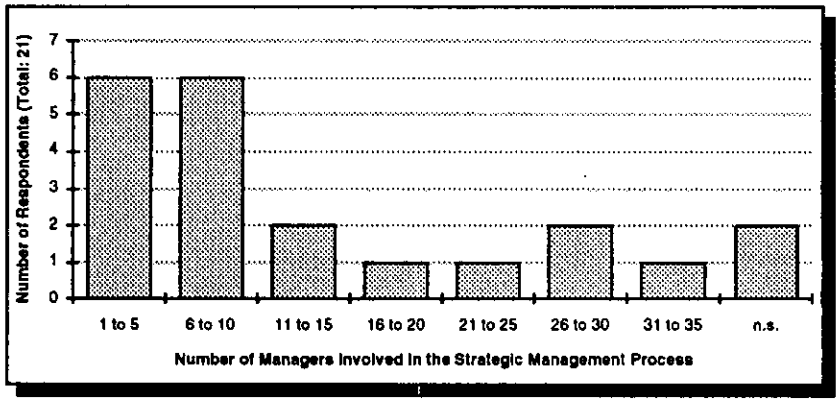

Figure 10. Number of Managers Regularly Involved in the Strategic Management Process

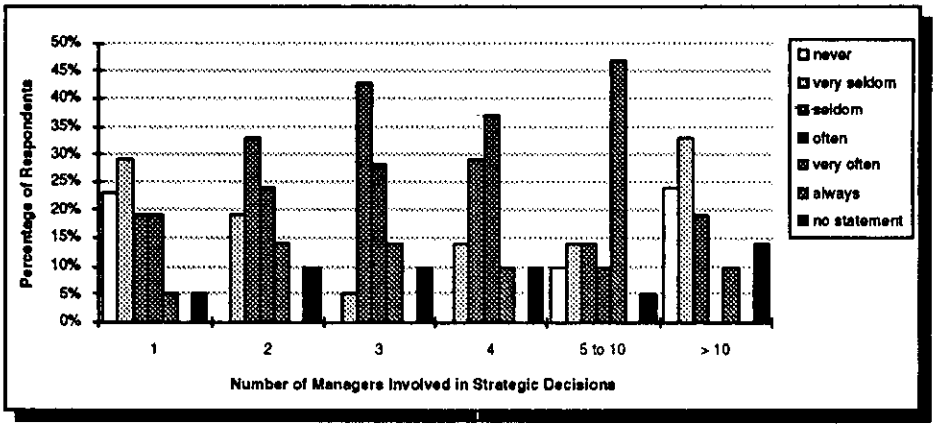

Figure 11. Number of Managers Regularly Involved in Strategic Decisions

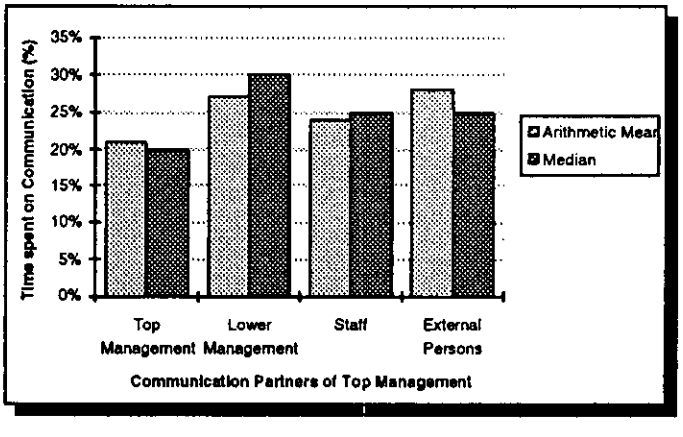

Figure 12. Distribution of Communication with Different Communication Partners

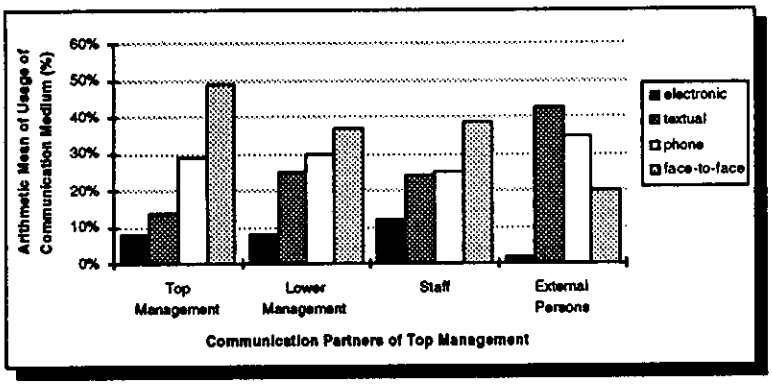

Figure 13. Communication Modes of Top Management

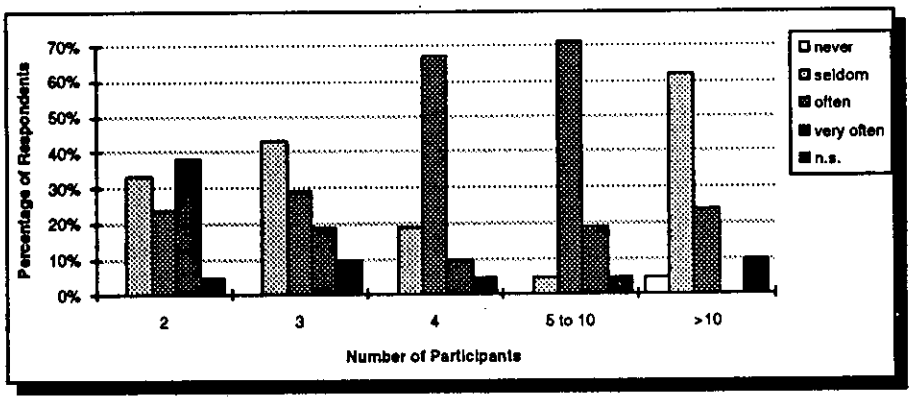

Figure 14. Number of Participants in Planned Meetings

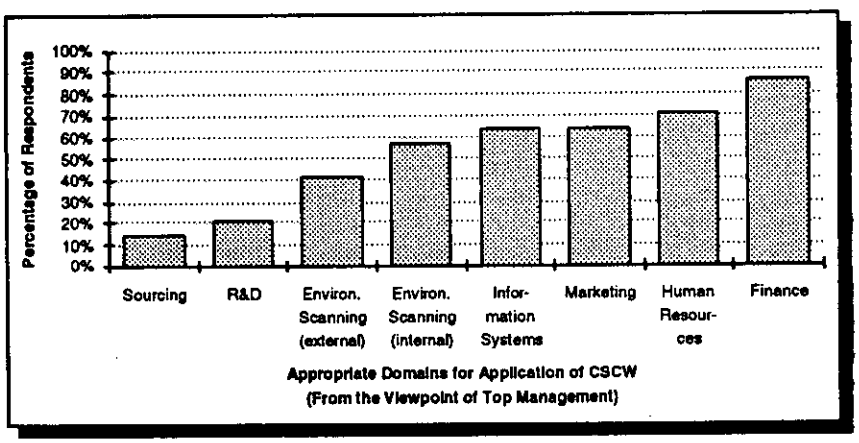

Figure 15. Appropriate Domains for the Application of CSCW

Considering the results shown in section 4.1.1 (only one bank has an electronic meeting systems [EMS]; the bank found EMS unimportant; only one bank plans to install an EMS) and the results shown in this section (the majority of top managers are satisfied with current meetings; only a quarter would appreciate the application of EMS), we assume little potential for EMS in the strategic management of large-scale Swiss banks for the near future.

4.2.4 Trends in CSCW from the viewpoint of top management. To explore trends in CSCW for top management, we asked respondents about the usefulness of CSCW in general; their assessment about trends in general; and for specific domains in which CSCW could be deployed.

First we asked: "How do you assess general trends for CSCW in strategic management within your organization?" Of the respondents, 66% said that they expect increasing application of CSCW; 0% expect a downward tendency in the application of CSCW; 24% expect no changes; and 10% gave no answer.

Second we asked: "Do you think CSCW is useful in strategic management?" The majority of respondents (66%) said that CSCW is useful (14% *it is not useful*, 20% *no statement*).

Those respondents who considered CSCW in strategic management as useful were asked to give appropriate domains for the application of CSCW. Information systems, marketing, human resources and finance are the most appropriate domains from the viewpoint of top management (see Figure 15).

4.4. Limitations

The participation in our study was voluntary. For this reason, we have to keep in mind that respondents and nonrespondents might differ in some investigated characteristics. In view of this situation, and in spite of the fact that our response rate was 44%, there is a possibility of skewed results. We assume, however, that our data represents a random sample of the investigated domain and therefore believe that our study can be seen as representative.

5. CONCLUSIONS AND FURTHER WORK

We presented results and preliminary interpretations of an empirical study. The study was conducted in order to get a clear understanding of group work for the purpose of supporting strategic management in the most effective manner. The study was part of the project STRATUM, the overall goal of which is to develop tools to support cooperative work especially in the strategic management of business enterprises. Two research questions were formulated in order to investigate the current usage of groupware in strategic management as well as to reveal the potential of CSCW regarding usage by top management. The most interesting preliminary results are:

- Looking at groupware supporting generic tasks, we found that the most available and important system class providing functions for communication is e-mail. It was interesting to see that nearly 40% of respondents plan to apply workflow management systems which mainly provide functions for coordination.

- Looking at the class of workgroup computing systems, we found that, in particular, group calendars and project management systems are commonly available and also assessed as important from the viewpoint of top management. It was revealing to see that electronic meeting systems have not yet penetrated the banking sector at all.

- The results of questions asked about systems providing support for specialized tasks show that a large number of different systems are available. Most of these systems do not support group functions.

In summary, we can say that we now have a good overview about the current usage and the potential of CSCW in strategic management and how top management assesses groupware in general. Further results gave us detailed knowledge about different organizational aspects of top management (e.g., number of managers regularly involved in the strategic management process or in strategic decisions respectively). We also collected detailed data about communication of top management and in particular about meetings.

We now have the basis for completing the analysis, the interpretations and in drawing conclusions through cross relations. In addition we are currently investigating qualitative statements through the use of case studies. For this purpose we selected interesting respondents for qualitative interview series. The results of these interviews will give us detailed information for the design, implementation and application of specific groupware types.

6. ACKNOWLEDGMENTS

We would like to thank Prof. Dr. K. Bauknecht for the support that made this work possible. This research was partially financed by the Swiss National Science Foundations.

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